



WHITE PAPER

Re-architecting Disaster Recovery Solutions Leveraging WAN Optimization Technology

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DR is Needed More than Ever

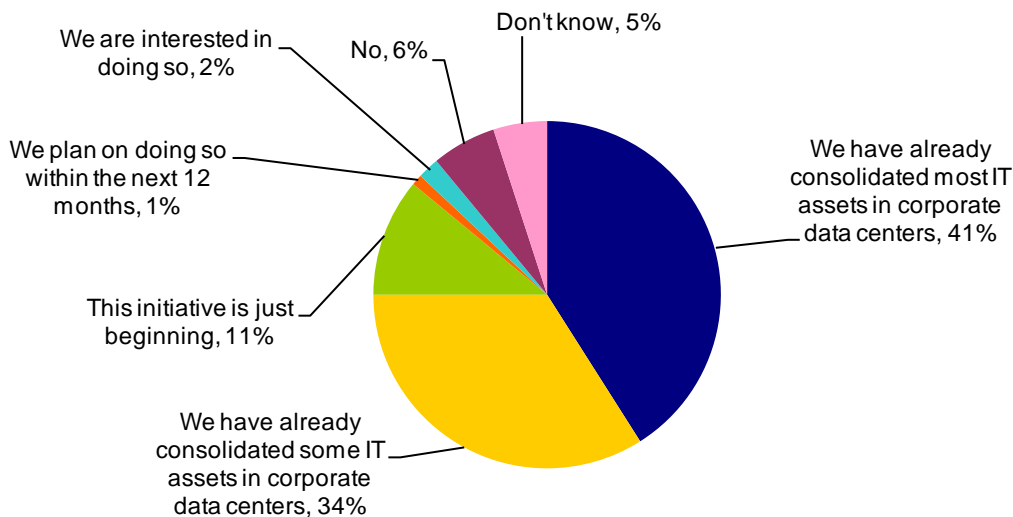
Disaster Recovery (DR) is not new—many organizations have employed some form of DR for quite some time. Companies have been replicating their mainframe, storage, and database systems for years. Before that, they moved paper documents to offsite locations.

So, what's new with DR? As business technology proliferated over the past 10 to 15 years, DR coverage expanded from back office systems to all types of additional business applications. New business applications and IT services help organizations react quickly to a dynamic marketplace and provide access to information—wherever and whenever it's needed. This trend is actually accelerating as:

- **Data Center consolidation centralizes productivity applications.** Companies are reducing the overall number of data centers, consolidating remote and branch office assets in the process. According to ESG research, 41% of large organizations have consolidated most IT assets in corporate data centers, while another 34% have consolidated some assets in corporate data centers (see Figure 1). While this has given IT greater operational control and lower costs, it also can lead to increased risk. Each remote site that accesses the centralized data center creates a potential point of failure. If the new centralized location were to fail, all the applications and services housed therein would be unavailable and its impact—as measured in lost productivity and revenue—could be far greater.

FIGURE 1. LARGE ORGANIZATIONS ARE CONSOLIDATING IT ASSETS IN CORPORATE DATA CENTERS

Is your organization actively consolidating IT assets in corporate data centers in order to centralize IT activities and remote office support?
(Percent of respondents, N=190)



Source: Enterprise Strategy Group, 2009

- **More non-employees rely on access to data center applications and services.** Business partners, suppliers, and customers are increasingly provided with access to information and services supported by the corporate data center. The inability to access that information in the event of a disaster would impact both the top and bottom lines for those businesses. In the wake of 9/11, many companies mandated that their business partners have a robust DR plan in place before signing significant business contracts. Even though *your* business can recover quickly from an outage, if your business partners can't, you will still be affected.

- **Companies rely on electronic communication.** E-mail, instant messaging, IP telephony, and collaboration applications have become integral parts of many companies' business processes. The inability to communicate with employees, customers, and partners could bring business to a grinding halt. In the event of a disaster, the ability to communicate is even more critical to eliminate confusion and keep employees organized and productive. After Hurricane Katrina ravaged the southern US in 2005, many organizations were left without any form of communication. As a result, many of those companies went out of business. Inability to communicate with employees spread out across several states meant that these organizations couldn't regroup quickly and the business suffered.
- **The potential for data loss is increased.** According to ESG research, 84% of respondents in large organizations provide network and application access to non-employee users (i.e., business partners, suppliers, customers, etc.). Given the volume of users accessing information, securing the environment is crucial. Allowing unauthorized users to access classified information or failing to protect data in flight could result in significant security breaches.

Regulations are Driving More DR Initiatives

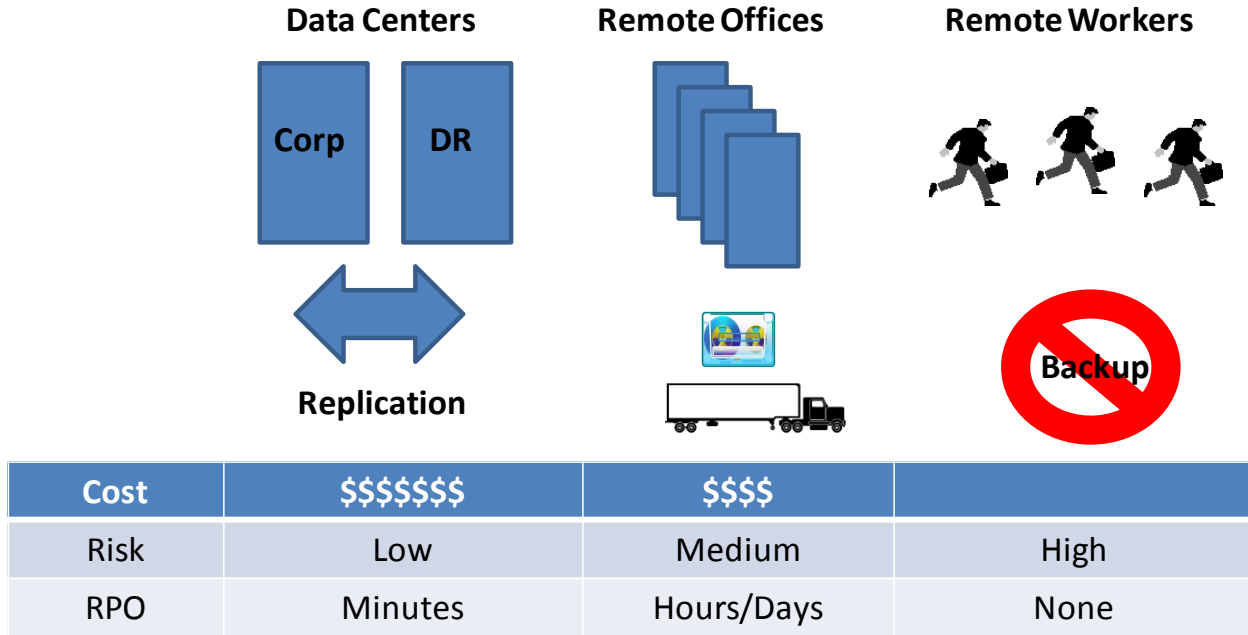
Compliance and regulatory issues are also playing a bigger role in disaster recovery plans. While not all regulations mandate a formal disaster recovery plan, many—like HIPAA in the healthcare industry—specify that data must be kept available. The best way to ensure availability is to keep data protected and recoverable. As most of the health care industry becomes digitized, there is no excuse for missing data. This is also true in the financial services industry governed by the Gramm-Leach Bliley Act (GLBA), BASIL II, and SEC rules that specify business continuity in the event of a man-made or natural disaster.

State disclosure laws for data breaches and the EU data directive are playing more prominent roles as well. In these cases, it is not the fines and penalties that are motivating organizations to protect data better, but the costs of notification, loss of customer confidence, and the resulting impact to shareholder value that compels companies to act. In fact, with an average notification cost of \$90 per customer and the average number of users impacted by a lost tape averaging over 900,000 (as reported from Oct 07 - Oct 08), a single lost tape incident can cost a company in excess of \$80 million—without factoring in any impact to stock price.

DR is Hard—and Getting Harder

Creating a disaster recovery environment for back office systems was difficult to begin with—requiring large amounts of data to be transferred over a network. Due to protocol and application latency issues, most secondary sites were limited to distances of less than 10km and solutions were extremely expensive to implement. An increasing reliance on distributed systems and productivity applications has only made it harder. While more solutions are available, new business continuity demands make DR environments more complex and costly, requiring specific skill sets. Specifically, DR plans now need to include adequate solutions for remote offices and remote workers. Figure 2 illustrates some of these challenges.

FIGURE 2. BENEFITS OF WAN OPTIMIZATION



Source: Enterprise Strategy Group, 2009

Centralizing data centers solved some problems, but also served to exacerbate difficulties in other areas, like guaranteeing availability on the network. Other DR issues currently plaguing CIOs include:

- **The cost of bandwidth.** Prior to the advent of Web 2.0, a point to point T1 line (1.5 Mbps) might have been sufficient connectivity for remote offices. However, today's data-intensive web applications, rich media, VoIP, and virtual desktops demand more bandwidth and ubiquitous connectivity. Depending on the amount of data and distance to the DR site required, implementations can become prohibitively expensive. Even harder, accurately sizing connectivity for day one and day 1000 can be extremely difficult in a rapidly changing environment.
- **The amount of data transferred is growing and fluctuating.** Future applications and data growth aren't the only considerations impacting bandwidth requirements; business processes can also create instant traffic congestion. Certain tasks like data replication, nightly backups, and month- or year-end processes result in short term spikes that can dramatically impact network performance. Failure to accommodate these fluctuations could ultimately impact data availability and user productivity. This is especially true for companies leveraging server virtualization technologies that need to replicate not only data files, but also the operating system and applications responsible for creating those files. In these cases, moving a lot of data in a very short time may be a major challenge. Companies are forced to accept asynchronous data replication because of the increased data loads and inability (either cost or availability) to secure sufficient bandwidth to meet these transient needs. Data from remote offices and remote workers also need to be included in these calculations as companies move away from tape backup to centralized disk based backups.
- **Ensuring DR traffic does not hinder application performance.** The implementation of a DR environment cannot have a negative impact on regular business processes. Users expect applications to perform as they did prior to the DR site being added. They demand LAN-like performance, even if the data needs to traverse the WAN. IT needs to be able to prioritize network traffic based on the criticality of the application to the business. Without this capability, productivity on mission critical applications could suffer because other employees are checking YouTube.

- **Delivering adequate DR service level agreements (SLAs).** The network can have a dramatic impact on DR SLAs, typically measured by recovery point objectives (RPO- the amount of data you can afford to lose, measured in terms of minutes, hours, or days) and recovery time objectives (RTO- how quickly you need to recover your operations, measured in terms of minutes, hours, or days). Traditionally, organizations ordered more bandwidth to improve SLAs. However, given the high cost of bandwidth, customers are challenged to meet desired DR SLAs when constrained by a flat or shrinking budget. Failing to do so could result in data loss and significantly longer recovery times in the event of a disaster. With most companies leveraging deduplication to perform incremental backups, many organizations forget that the initial backup and full data restore times can be very long over the network without sufficient bandwidth.

In addition to playing a major role in a company's DR plan, the network must also provide ample security as well as the ability to report and audit for governance and compliance.

DR Meets WAN Optimization

WAN optimization has been instrumental in enhancing network connectivity between remote offices and data centers, enabling the consolidation of applications and services into a centralized data center environment. Beyond this use, however, WAN optimization has proven to be a critical enabler in DR environments. Regardless of the current state of your DR solution, WAN optimization technology could have a positive impact on the efficiency and success rates of existing solutions and may even serve as a catalyst that increases the feasibility of creating a more robust DR solution.

WAN Optimization Enables Robust DR Solutions

Most businesses view IT as a cost center and, as such, challenge IT to keep budgets in check. WAN optimization technologies let companies do more with less, enabling them to transfer more data over a smaller network connection. Such efficiency could deliver significant improvements in both existing and new disaster recovery environments.

Existing DR solutions. For existing DR environments that leverage network connectivity, WAN optimization can provide several benefits, including:

- **Reduced network costs.** In a best case scenario, companies may be able to reduce existing network bandwidth requirements or at least eliminate the need to order additional capacity. WAN optimization solutions can improve network traffic management and efficiency. This could reduce total network consumption needs and enable network costs to remain flat or decrease.
- **Improved Recovery Point and Time Objectives (RPO & RTO).** WAN optimization substantially reduces the time it takes to replicate data, perform backups, and, more importantly, recover data by creating optimizing protocols and reducing latency. By removing tape backups from remote sites and transitioning to disk-based backup at a corporate data center, companies can lower RPOs from 24 hours to less than one, depending on the frequency of the incremental backup. Recovery times are also lessened by a more efficient transfer of data, which means larger amounts of data can be moved in smaller windows.
- **Enhanced security.** Best practices for transferring sensitive business information over a network requires that the data be encrypted. Best of breed WAN optimization solutions will not only provide some type of IPsec encryption between appliances, but will also work with existing encryption solutions without complicating key management.

New DR solutions. In many cases, implementing a robust DR plan is thwarted by network difficulties. Typically, the network is the limiting factor due to costs or bandwidth availability. By leveraging WAN optimization, companies can:

- Dramatically reduce network costs. Users can push more data traffic over a smaller network connection, minimizing network costs.
- Enable solutions in locations previously limited by bandwidth or distance factors. Many organizations' DR plans are restricted based on geography and available connectivity. WAN optimization technology can overcome latency issues (via protocol optimization) that couldn't be solved by any amount of additional bandwidth. In many cases, it can also enable data to travel longer distances without impacting required RPOs. For those locations with limited bandwidth, consider additional technologies such as deduplication, compression, and other optimization techniques that enable data to be transferred as efficiently as possible.
- Centralize tape backup functions to a data center. One of the more common DR uses for WAN optimization is to enable consolidated backup and lower RPOs because the network is no longer a barrier to performing more frequent incremental backups. Additionally, consolidation results in lower capital and operational costs as there is less equipment at each remote site and no requirement for a backup administrator at those locations.

WAN Optimization Solutions Scale Across Many DR Environments

WAN optimization solutions have grown to encompass high bandwidth data center traffic as well as remote and mobile workers. Each environment has its own unique DR requirements.

- **Data center to data center:** One of the challenges in selecting a second site for DR is obtaining suitable connectivity at the desired location. Depending on the amount of data and the distance between locations, traditional carriers may not be able to provision sufficient bandwidth. However, WAN optimization technologies with multi-Gbps throughput offering deduplication, compression, and high availability configurations can create efficiencies that enable the use of standard service provider networks. This could potentially save a company millions in capital and operating costs that it would have spent relocating a data center due to insufficient network connectivity. At the very least, there is the potential to save tens to hundreds of thousands of dollars in reduced network costs between sites.
- **Remote office to data center:** As more services are consolidated in the data center, IT will try to limit not only the number of applications, but also the amount of hardware and software required at each location. This includes removing the burden of performing tape backups at each site. Eliminating tape backups reduces management overhead at each site, minimizes IT support requirements, and dramatically reduces software licenses at each remote site. WAN optimization provides the requisite services to back up any local data to a centralized data center.
- **Remote worker to data center:** Remote access is a much higher priority for companies as more workers go mobile or begin working remotely. Because they may be accessing sensitive business information, it is important to back up all remote laptops and desktops. Plus, by leveraging client-based WAN optimization technology, users will also enjoy improved application performance. Additionally, in the event of a disaster, WAN optimization technology can be used by employees displaced from their traditional workspaces to connect to a remote data center and continue business operations with optimized levels of application performance.

WAN Optimization can Multiply IT Efficiencies

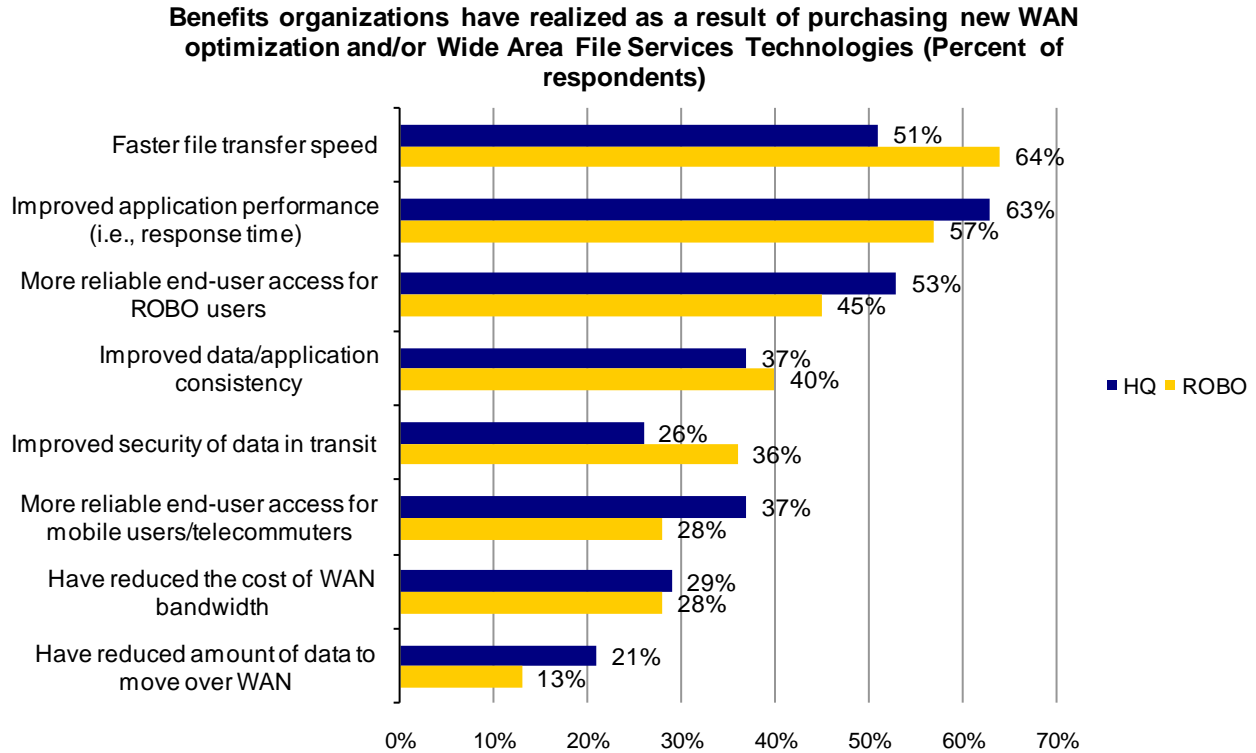
WAN optimization technologies will not only enhance DR environments, they can also bolster performance to dramatically increase productivity at many different levels across IT. Specifically, WAN optimization technologies provide:

- **More efficient access to large files.** Less data needs to be sent over the network when technologies like deduplication, compression, and caching are deployed. This means that only changed data is sent between sites, which results in higher productivity as frequently requested information is stored locally and access times are dramatically shortened as only new data is transferred.
- **Accelerated application performance.** Leveraging technologies like load balancing and policy-based Quality of Service (QoS), critical applications can receive priority bandwidth allocation. Additionally, protocol optimization is used to reduce the impact of chatty protocols, streamlining communication between sites. This applies not only to applications that enable DR-like replication and clustering, but also for critical day to day applications like Exchange, SQL, and SharePoint being accessed over the network. The benefits extend beyond the data center and remote offices to include mobile or home workers.
- **Enhanced security.** WAN optimization technologies provide secure communications by encrypting data in flight and authenticating users accessing applications and data. WAN optimization can also help reduce the load on back-end servers by offloading processor intensive security operations for SSL/TLS and network encryption. If organizations leverage WAN optimization to consolidate backups from remote sites, it would also dramatically reduce the potential for lost or stolen tapes from those sites.
- **The ability to consolidate.** By removing data and its associated server and storage hardware from remote sites, capital costs can be reduced, higher levels of data protection and security are possible, and network budgets can be held in check or even reduced. Given that WAN optimization technologies ensure that application performance is unaffected after a consolidation, there would have to be significant business value involved in the choice to continue to keep data at the edge.

Overall, WAN optimization users should achieve the same type of benefits with DR that they've realized with branch office connectivity. According to ESG research,¹ companies that have adopted WAN optimization technologies have realized significant benefits (see Figure 2).

¹ Source: ESG Research Report, *Branch Office Optimization*, January 2007.

FIGURE 3. BENEFITS OF WAN OPTIMIZATION

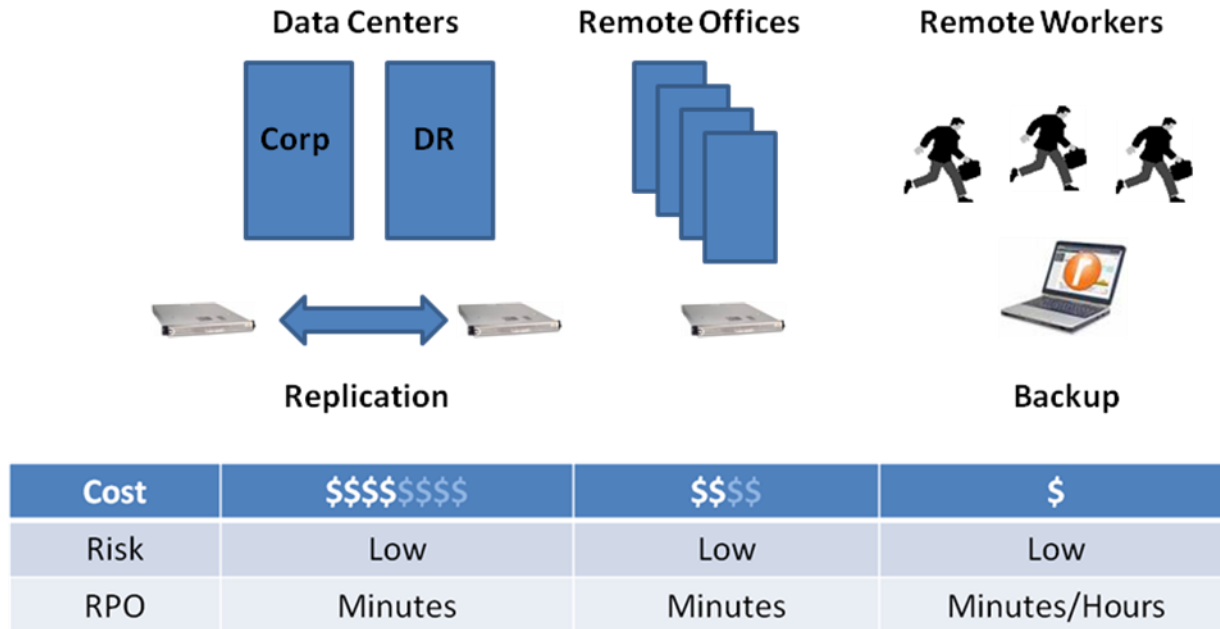


Source: Enterprise Strategy Group, 2009

Riverbed WAN Optimization Solutions

Riverbed Technology is a pioneer and leading provider in the field of WAN optimization technologies. Since its inception in 2002, Riverbed has been solely focused on delivering solutions to help accelerate applications, and optimize WAN traffic. Its Steelhead appliances scale from remote offices with just a few workers to enterprise data centers supporting thousands. Riverbed also offers a software-only option called Steelhead Mobile that is suitable for remote or mobile workers, allowing them to interface with Steelhead appliances located at any company facility. In the event of a disaster, Steelhead Mobile can also be used to optimize connectivity to the DR site. To ensure ease of use and deployment across a global enterprise, Riverbed leverages one operating system, the Riverbed Optimization System (RiOS), for the entire product line—including Steelhead Mobile. The solutions scale from laptops with Internet connections to data center level connectivity with 4 Gbps throughput. Figure 4 illustrates how Riverbed products can enhance DR across the entire enterprise.

FIGURE 4. RIVERBED ENHANCED DR ENVIRONMENTS



Source: Enterprise Strategy Group, 2009

With over 5,000 customers, it was pretty easy to find a customer willing to talk about their environment and validate Riverbed’s technology in a DR environment. Implementing Riverbed Steelhead appliances yielded dramatic results.

Riverbed Solutions in Action

Altadis USA is part of a large multi-national manufacturer of tobacco products. Its US operations are based in Florida, which presents some unique regionally-based weather challenges and necessitates a robust DR environment—one that includes a secondary data center that is located out of region.

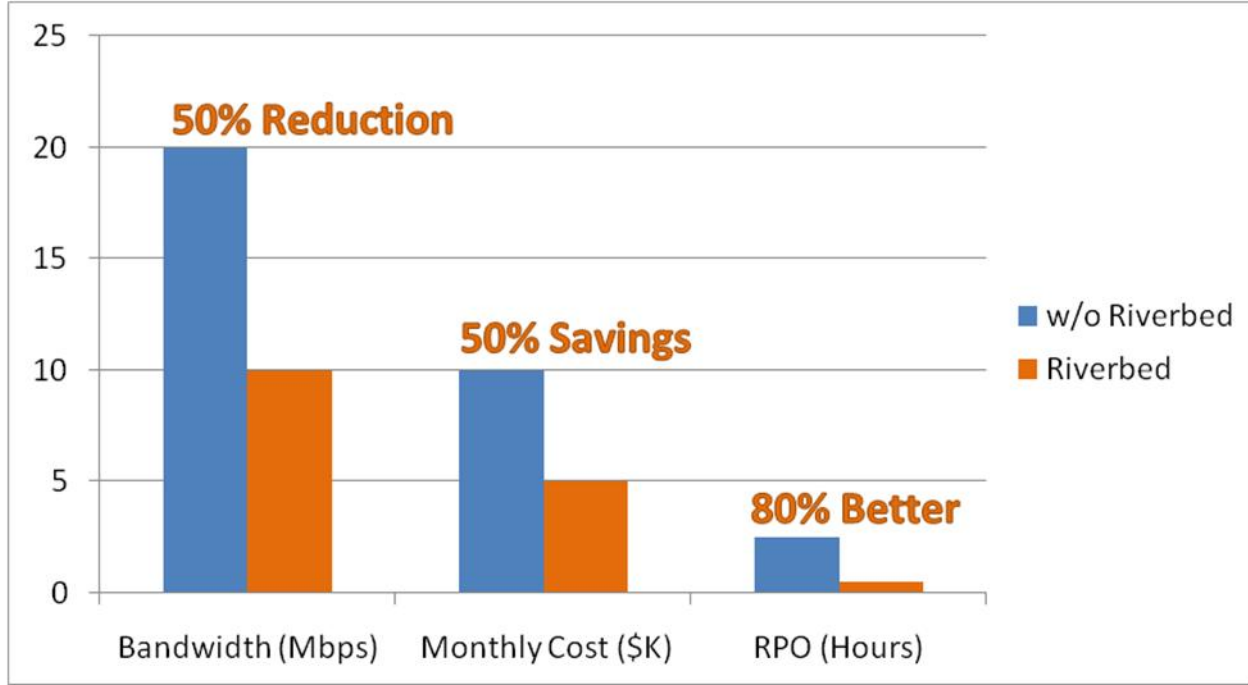
Environment: Altadis USA implemented a more robust DR environment after its primary data center was affected during Hurricane Wilma in 2005. The company established a secondary site located out of the region to support its SAN-to-SAN data replication environment. The data centers are connected via a 10 Mbps link and the data is replicated asynchronously (not in real-time) due to the distances involved. It provides the business with an RPO of 2.5 hours. This means that in the event of a disaster, only 2.5 hours of data will be lost. Prior to the second site’s implementation, the RPO would have been at least 24 hours. As part of the company’s best practices, IT fails over to the secondary site during hurricane season and replicates back to the primary.

Challenge: Facing significant data growth, Altadis USA needed to increase bandwidth between sites. Based on network traffic, bandwidth would have to be doubled to a 20 Mbps connection, a move that would have increased its network spend by \$4-5K per month, resulting in an extra cost of \$48K to \$60K per year. Given the pressure to keep budgets flat or down, the IT department researched alternatives.

Solution: While investigating options, the director of IT, Andrew Vega, discovered Riverbed and decided to meet with the sales team. After the first meeting, Altadis USA decided to conduct a proof of concept test between its facilities to validate the sales team’s claims. Not only was the test successful, but the test equipment was never removed—Altadis USA opted to purchase the appliances already in place. With a small upfront investment in Riverbed, the firm could keep its network bandwidth and costs flat, enabling a return on investment (ROI) in less than one year.

The Results: In addition to keeping its network spending down by avoiding an additional \$48-60K per year, Altadis USA was able to dramatically reduce its recovery point objective from 2.5 hours down to 30 minutes—an 80% reduction.

FIGURE 5. RIVERBED RESULTS AT ALTADIS



Source: Enterprise Strategy Group, 2009

Based on testing, IT also feels confident that, with the current solution, they can increase their throughput to around 200–300Mbps before needing an upgrade—not a network upgrade, just a move to a bigger Riverbed appliance. Most importantly, the IT staff doesn’t have to worry about spending a lot of time maintaining the Steelhead appliance as it has performed flawlessly. It doesn’t require any attention—it just does its job.

Conclusion

Corporate computing has moved beyond mainframe systems and back office processing; it is only natural that DR technologies follow the same path. This is easier said than done, however, as network-based business applications, services, and files often demand low latency connectivity, large amounts of bandwidth, and unforgiving SLAs. If a DR architecture can’t deliver the goods, user productivity, employee morale, and corporate revenue are bound to suffer. Ineffective DR also creates potential for data loss, failed recovery attempts, and business outages. Organizations need to mitigate the risk created by consolidating data and services into the data center by implementing a proper DR environment.

WAN optimization can have a dramatic impact on existing DR environments. Also, it may be the key technology that enables DR where it didn’t previously exist. End-users are rapidly adopting server virtualization technologies and incorporating them into best practices for consolidating and optimizing the server environment. WAN optimization has the ability to do the same for the network. A modest investment (especially when compared to the costs of outage) in WAN optimization can dramatically reduce or at least defer ongoing network costs, typically providing an ROI in less than one year.

**Re-architecting Disaster Recovery Solutions
Leveraging WAN Optimization Technology**

Organizations currently utilizing a DR solution that leverages a network should consider the improvement that WAN optimization technologies could bring to their environment. This is especially true for those organizations at an inflexion point—needing to upgrade bandwidth or improve RPOs. While solutions that were engineered seven or eight years ago have worked fine, there is currently an opportunity to dramatically reduce costs and improve performance. If you have delayed implementing a DR solution because of high network costs and the inability to achieve desired RPOs, WAN optimization technologies, like those from Riverbed, could be the solution that enables you to finally provide the protection your data so desperately needs.



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